The decay of empty tests of testate amoebae in soil (Rhizopoda, Protozoa) *

R. MEISTERFELD & M. HEISTERBAUM
Inst. f. Zoologie, RWTH
Kopernikusstr. 16, D-5100 Aachen (BUNDESREPUBLIK DEUTSCHLAND)

In recent years evidence for the important role of Protozoa as predators of microorganisms has accumulated. In microcosm experiments their stimulating effects on nutrient cycling was demonstrated. Testate amoebae are, together with naked amoebae, the major protozoan group in soils and because of their test,

TABLE I

Disappearance of empty tests after one week.

Species	Loss after sterilisation %	Temperature ° C	Loss after 7 days %
Centropyxis sylvatica	30.0	10	19.6
		20	41.1
Cyclopyxis eurystoma	27.5	10	12.9
		20	42.7
Trigonopyxis arcula	22.6	10	23.5
		20	54.8
Hyalosphenia subflava	30.7	10	15.7
		20	42.8
Nebela collaris	30.4	10	-
		20	36.7
N. militaris	30.2	10	-
		20	36.0
N. tincta	25.0	10	-
		20	36.8
Phryganella acropodia	5.8	10	30.3
		20	54.7
Euglypha strigosa	30.5	10	-
		20	39.6
E. rotunda	17.4	10	23.1
		20	44.7
Assulina muscorum	15.7	10	25.1
		20	55.7
Corythion dubium	14.2	10	24.8
		20	38.0
Trinema complanatum	13.3	10	30.2
		20	40.8
T. lineare	14.1	10	27.2
		20	40.0

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which makes estimation of death rates possible, very well suited to measure secondary production. But the accuracy of these estimates depends very much on the knowledge of the disappearance of the empty tests from the soil (LOUSIER & PARKINSON, 1981).

To study test decomposition F layer material of an 130 year old beech forest in the Solling area (site description in MEISTERFELD, 1980) was moistened with Standard I nutrient broth (0.2 %) to stimulate growth of bacteria. This resulted in a rapid increase of small euglyphid testaceans. Then microcosms were set up and oven-dried at 80° C for 5 h to kill all testate amoebae but to allow spores of microorganisms to survive. Previous experiments had shown that higher temperatures and longer drying resulted in significantly higher losses and faster disappearance of shells. After drying, the soil was remoistened with distilled water.

Two series of experiments at 10 and 20° C were set up. The moisture content varied between 74 and 78 %. After 3, 7, 10, 20, 30, 42 and 97 days 5 microcosms per series were fixed and the number of testate amoebae estimated by direct microscopic counting. The table shows the losses after 7 days. The tests disappeared significantly slower than in previously reported experiments (LOUSIER & PARKINSON, 1981). In contrast to their results, decomposition is stimulated by higher temperatures. In no case was the test disappearance linear; a logarithmic model of decay fitted the data far better. Most of the species studied showed two different patterns of decay. After very rapid decomposition during the first 10 days with decay constants k between 0.059 and 0.1 (per day) the process slowed down with k between 0.002 and 0.017. Patterns of test disappearance for species whose tests are composed of sediment particles and those whose shells were made of platelets were not significantly different.

References

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